Claims

1. A microscope system (1) with at least one lens (9) that is present in the microscope system (1) and that defines an illumination field (46), with at least one light source (3) that emits an illuminating light beam (5) that illuminates a specimen (10) through the lens (9), with at least one detector (20) that, pixel-by-pixel, detects a detection light beam (12) coming from the specimen (10), with an electronic circuit (14) located downstream from the detector (20) and having a memory unit (15) in which a wavelength-dependent brightness distribution of the illumination field (46) of the lenses (9) present in the microscope system (1) is saved, characterized in that an actuatable element (13) is provided that controls the intensity of the illuminating light beam (5) pixel-by-pixel as a function of the stored, wavelength-dependent brightness distribution in such a way that the illumination field (46) is homogeneously illuminated, and in that the electronic circuit (14) computes the saved wavelength-dependent brightness distribution pixel-by-pixel in such a way that a homogeneously illuminated image field (40) is formed.

2. The microscope system (1) according to claim 1, characterized in that the actuatable element (13) is a control circuit (60) that directly controls the intensity of the illuminating light beam (5) coming from the light source (3) as a function of the stored, wavelength-dependent brightness distribution.

3. The microscope system (1) according to claim 1, characterized in that the actuatable element (13) is arranged in the illuminating light beam (5).

4. The microscope system (1) according to claim 1, characterized in that the actuatable element (13) in the illuminating light beam (5) is an LCD matrix whose individual pixels are actuated according to the stored, wavelength-dependent brightness distribution, and in that the detector (20) is a CCD chip.

5. The microscope system according to any of claims 1 to 4, characterized in that a scanning device (16) is provided in the illuminating light beam (5) of the microscope system and it conducts the illuminating light beam (5) pixel-by-pixel over or through the specimen (10).

6. The microscope system according to claim 3, characterized in that the actuatable element (13) in the illuminating light beam is an acousto-optic element that can be actuated as a function of the wavelength-dependent brightness distribution saved in the memory unit (15) in such a way that the illumination field consisting of the individual pixels has a homogeneous brightness distribution.

7. The microscope system according to claim 6, characterized in that the acousto-optic element (13) is an AOTF or an AOBS or an AOM.

8. The microscope system according to any of claims 1 to 7, characterized in that at least one laser that generates the illuminating light beam is provided as the light source (3).

9. The microscope system according to claim 8, characterized in that the at least one laser is a multiline laser.

10. The microscope system according to claim 8, characterized in that the at least one laser emits a continuous wavelength spectrum.

11. The microscope system according to any of claims 6 to 10, characterized in that the detector (20) comprises at least one light-sensitive element (36, 37) that serially captures the pixels of the illumination field on the specimen (10), and the electronic circuit (14) combines the individual pixels to form an image field (40) that can be computed with the appropriate wavelength-dependent brightness distribution.

12. The microscope system according to claim 11, characterized in that the detector (20) comprises an SP module having at least one light-sensitive element (36, 37).

13. The microscope system according to claim 1, characterized in that the electronic circuit (14) is an FPGA (Field-Programmable Gate Array).

14. The microscope system according to claim 1, characterized in that the electronic circuit (14) is implemented in a PC associated with the microscope.

15. The microscope system according to claim 1, characterized in that the wavelength-dependent brightness distribution is implemented as a model.

16. The microscope system according to claim 15, characterized in that the spatial, wavelength-dependent brightness distribution is approximated as a polynomial of a higher order and the various coefficients of the model are approximated as a spline function or as a differently modeled spectral function.

17. A method for the shading correction of at least one lens (9) that is present in the microscope system (1) and that defines an illumination field, comprising at least one light source (3) that emits an illuminating light beam that illuminates a specimen (10) through the lens (9) and comprising at least one detector (20), characterized by the following steps:

    - saving the wavelength-dependent brightness distribution in a memory unit (15) of an electronic circuit (14);

    - pixel-by-pixel actuation of an actuatable element (13) with the wavelength-dependent brightness distribution of the illumination field of the lens (9) in such a way that the illumination field is homogeneously illuminated;

- pixel-by-pixel detection of the detection light beam (12) coming from the specimen (10); and

- employing the wavelength-dependent brightness distribution of the illumination field of the lens (9) in order to compute the image field captured with the lens (9).

18. The method according to claim 17, characterized in that the wavelength-dependent brightness distribution is determined by means of the detector (20) pixel-by-pixel for each lens (9) present in the microscope system (1), and in that the determined brightness distribution is saved in the memory unit (15) of the electronic circuit (14).

19. The method according to claims 17 and 18, characterized in that the actuatable element (13) is a control circuit (60) with which the intensity of the illuminating light beam (5) coming from the light source (3) is directly controlled as a function of the stored, wavelength-dependent brightness distribution.

20. The method according to claim 17, characterized in that the actuatable element (13) is arranged in the illuminating light beam (5).

21. The method according to claim 20, characterized in that the actuatable element (13) in the illuminating light beam (5) is an LCD matrix whose individual pixels are actuated according to the stored, wavelength-dependent brightness distribution, and in that the detector (20) is a CCD chip with which the wavelength-dependent brightness distribution of the image field (40) is determined.

22. The method according to any of claims 17 to 20, characterized in that a scanning device (16) is provided in the illuminating light beam (5) of the microscope system (1), with which scanning device (16) the illuminating light beam (5) is conducted pixel-by-pixel over or through the specimen (10).

23. The method according to claim 20, characterized in that the actuatable element (13) in the illuminating light beam (5) is an acousto-optic element that is actuated as a function of the wavelength-dependent brightness distribution saved in the memory unit (15) in such a way that the illumination field consisting of the individual pixels has a homogeneous brightness distribution on or in the specimen (10).

24. The method according to claim 23, characterized in that the acousto-optic element (13) is an AOTF or an AOBS or an AOM.

25. The method according to any of claims 17 to 24, characterized in that at least one laser is provided as the light source (3) with which the illuminating light beam (5) is generated for the microscope system (1).

26. The method according to claim 25, characterized in that the at least one laser is a multiline laser.

27. The method according to claim 25, characterized in that the at least one laser emits a continuous wavelength spectrum.

28. The method according to any of claims 17 to 27, characterized in that the detector (20) comprises at least one light-sensitive element (36, 37) with which the pixels of the illumination field on the specimen (10) are serially captured, and in that, with the electronic circuit (14), the individual pixels are combined to form an image field (40) that can be computed with the appropriate wavelength-dependent brightness distribution.

29. The method according to claim 28, characterized in that the detector (20) comprises an SP module having at least one light-sensitive element (36, 37).

30. The method according to claim 17, characterized in that the electronic circuit (14) is an FPGA (Field-Programmable Gate Array).

31. The method according to claim 17, characterized in that the electronic circuit (14) is implemented in a PC associated with the microscope system (1).

32. The method according to claim 17, characterized in that the wavelength-dependent brightness distribution is depicted as a model.

33. The method according to claim 18, characterized in that the spatial, wavelength-dependent brightness distribution is approximated as a polynomial of a higher order and the various coefficients of the model are approximated as a spline function or as a differently modeled spectral function.